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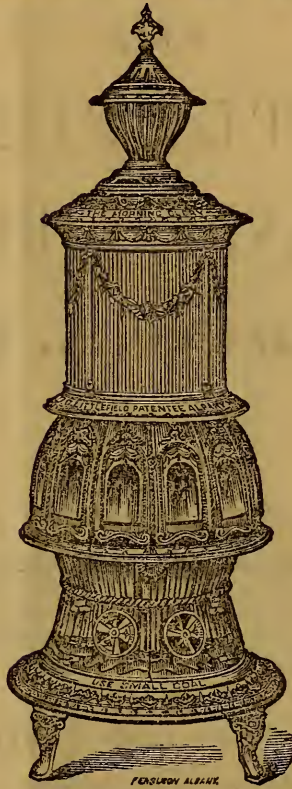
1868





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THE MORNING GLORY.



FORBES ALBANY

ORIGIN OF THE BASE-BURNING STOVE,

AND ITS

MODE OF OPERATION CLEARLY DEFINED,
BY ONE WHO HAS MADE THEM A STUDY FOR
FIFTEEN YEARS.

ALBANY, 1868.

Entered, according to an act of Congress, in the year 1868, by
D. G. LITTLEFIELD, in the Clerks's Office of the
Northern District of New York.

N

THE
LITTLEFIELD
STOVE MANUFACTURING CO.,
ALBANY, N. Y.

Organized August 25th, 1865, under the laws of the
State of New York.

IRA JAGGER AND D. G. LITTLEFIELD,

SOLE PROPRIETORS.

D. G. LITTLEFIELD,

GENERAL SUPERINTENDENT.

IRA JAGGER,

TREASURER.

H. C. LITTLEFIELD,

SECRETARY.

OFFICE NO. 47 MONTGOMERY STREET.

THE MORNING GLORY OF 1868

LOW TOP.



				RETAIL PRICE.
No. 20,	Diameter of base	20 inches,	- - -	\$21 00
21,	do	21 inches,	- - -	24 00
22,	do	22 inches,	- - -	28 00
23,	do	23 inches,	- - -	32 00
24,	do	24 inches,	- - -	36 00
25,	do	25 inches,	- - -	40 00
26,	do	26 inches,	- - -	44 00

It is expected that Dealers will add to these Prices the freight from Albany to their place of business only.

THE MORNING GLORY OF 1868.

HIGH TOP.



				RETAIL PRICE.
No. 26,	Diameter of base	26 inches,	- - -	\$48 00
28,	do	28 inches,	- - -	55 00
30,	do	30 inches,	- - -	65 00
32,	do	32 inches,	- - -	75 00

It is expected that Dealers will add to these Prices the freight from Albany to their place of business only.

LITTLEFIELD'S PARLOR FURNACE, OR DOUBLE HEATER.



			RETAIL PRICE.
No. 10,	Diameter of base,	24 inches,	\$30 00
11,	do	25½ inches,	36 00
12,	do	27 inches,	43 00
13,	do	28½ inches,	50 00


It is expected that Dealers will add to these Prices the freight from Albany to their place of business only. This Furnace can be used for warming the room where placed only, and have an urn on its top, or used as a DOUBLE HEATER, warming the room where placed and rooms above.

THE "MORNING GLORY"

PORTABLE HOT-AIR FURNACE.

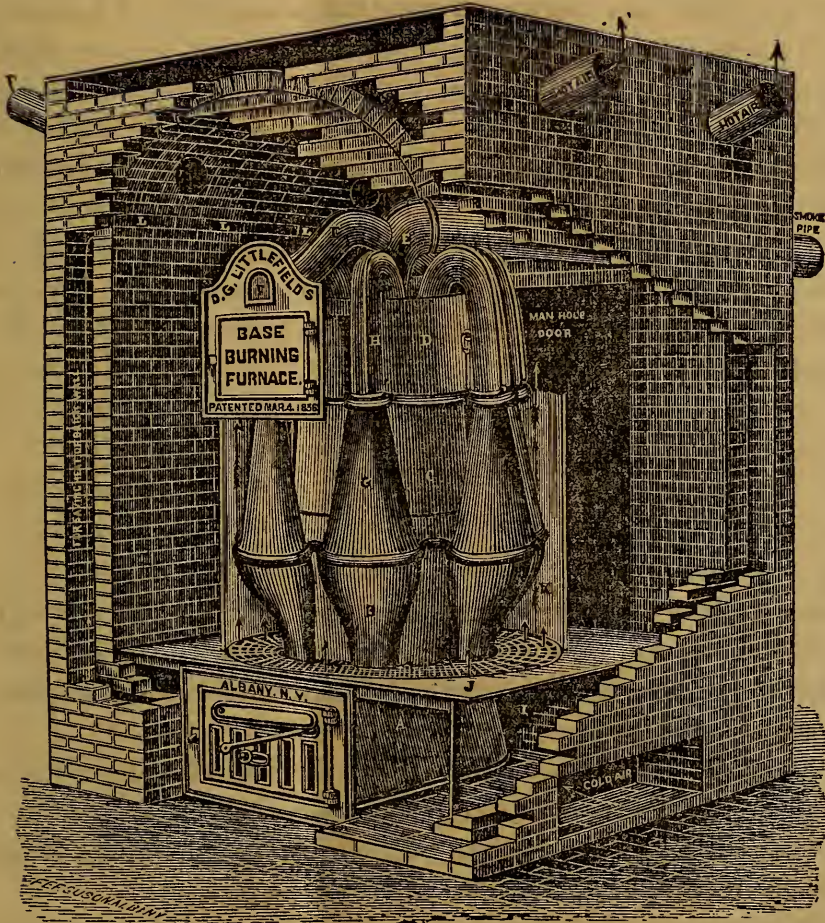


No. 15, size of base,	-	-	-	-	28 by 28 inches
17, do	-	-	-	-	30 by 30 inches
19, do	-	-	-	-	32 by 32 inches
21, do	-	-	-	-	34 by 34 inches

 The numbers 15, 17, 19 and 21, give the diameter of the Grate and the Magazine of each size respectively.

THE "MORNING GLORY"

BRICK FURNACE.



- | | | |
|-----------------------------|-----|-------------------------------------|
| No. 19, size of brick work, | - | 5 feet 4 inches by 5 feet 7 inches |
| 22, do | - - | 5 feet 8 inches by 5 feet 11 inches |
| 26, do | - - | 6 feet inches by 6 feet 3 inches |

Either size can be put up in a cellar that is six feet and six inches in the clear. The numbers 19, 22 and 26 give the diameter of the Grate and the Magazine of each size respectively.

SPECIAL NOTICE.

An intercourse of many years with those dealing in and using heating stoves, has convinced me that a majority of persons, when purchasing heating stoves, select sizes that are too small to heat economically the space required to be heated. It is poor economy to save four, or even eight dollars, by taking a small size, and afterward discover that it is too small for the work required of it.

The MORNING GLORY Stoves have been manufactured with a view of having them suited to rooms of certain size. For a room of ordinary height of ceiling, and taking to cover the floor, from

15 to 20	square	yards	of	carpet,	a	No.	20	or	21
20 to 25	"	"	"	"	"	"	21	or	22
25 to 35	"	"	"	"	"	"	22	or	23
35 to 45	"	"	"	"	"	"	23	or	24
45 to 60	"	"	"	"	"	"	25	or	26

Should there be more than the usual number of openings (doors and windows), or any other cause to render the heating of the room more than ordinarily difficult, a larger stove than indicated should be used.

I would say to the trade, better lose the sale of a stove, than permit one of these stoves to be sold for use in a place where you know or have doubts as to its being large enough to heat the space required of it.

Few persons realize that a room 21 feet by 21½ feet is more than twice as large as one 15 by 15, or that one, the ceiling of which is 12 feet high, has one-third more cubic feet of space than one of the same size and 9 feet ceiling.

Nos. 26, 28, 30 and 32, High Top, are designed for large rooms, halls, stores, etc., and of course, the size used should be selected to the size of the room.

The above remarks are based upon my own experience and observation, and are submitted to the trade, with the hope that they may have a beneficial effect.

D. G. LITTLEFIELD, Patentee.

PREFACE.

A FULL discussion of the principles applicable to the combustion of anthracite or hard coal cannot be entered upon. But to meet the requirements of the thousands now seeking for correct information, having reference to the BASE BURNING STOVE, the writer, who produced that stove, and who has made them a speciality for many years, is induced to write a few pages, and publish his various patents relating to the MORNING GLORY STOVES; wherein such information may be found.

"Self feeding," and *semi* base burning stoves, as distinguished from the common stove, employing no "*feeder*," had their origin many years ago; but it is well known to the trade, that, prior to the date of my inventions, making them what they were intended to be, that such stoves, as a class, were of no practical value. The series of inventions, some forty in number, relating to this class of stoves, that have been produced by the writer, are secured by various LETTERS PATENT, copies of which, not herein published, can be found at the PATENT OFFICE.

When, in 1853, the writer devoted his energies to the perfection of this class of stoves, they were unknown to the trade in this country; and, so far as to any reliable information, there was nothing to be found over and above the common "*Magazine Burner*;" a fire-pot, overhung by a "*feeder*," which arrangement had often been tried, and as often thrown aside as an imperfect machine; but believing that the principle involved in such stoves was in accordance with the correct theory, the writer was of the opinion, that such stoves, having the necessary invention bestowed upon them, would find a place among the things of the household, not afterward to be dispensed with.

That this has been fully accomplished, the many thousands who are now using the MORNING GLORY STOVES, will readily testify.

D. G. LITTLEFIELD.

It can in truth be said that the most economical stove is the one that produces the most perfect combustion. But few persons, even among stove manufacturers, have a correct knowledge of the

CHEMISTRY OF COMBUSTION,

and among those who use stoves there is a more profound ignorance on a subject, a correct knowledge of which, it must be conceded, would be of vital importance to the community.

Combustion, whether for producing light or heat, is their development by chemical combinations; and *perfect* combustion should be produced, whether it be in the burning of a candle or any of the various fluids for illuminating purposes, or of Anthracite and other fuels for heating purposes; and perfect combustion is the combination of the carbon of the combustible, with the largest measure of oxygen with which it is capable of uniting.

It is an absurd notion entertained by many persons, that a given amount of fuel however burned, will produce *only* a given amount of heat. Nothing can be more untrue than such assumption. It might as well be said that a candle gives the same light when it needs trimming, or that the lamp does as well toward lighting the apartment, when it smokes, as to say that ANTHRACITE, when burned in the common stove, will produce the same amount of heat as when burned in a BASE BURNING STOVE that is constructed in accordance with the correct theory.

The well known fact in chemistry that chemical combinations can only take place in certain definite proportions, ought to be understood by every person, viz.: That to produce the poorest quality of combustion (and there are only two that can be produced, *imperfect* and *perfect*) six parts of carbon combines with eight parts of oxygen to form carbonic oxide, and that the fuel *thus* consumed, only yields 20* per cent of the heat it is capable

* A diversity of opinion exists among scientific men as to the amount of heat produced by burning to produce carbonic oxide, or carbonic acid. DULONG estimates, that burning, to produce carbonic oxide, only produces 20 per cent; ANDREWS, 28 per cent, and GRASSI, 43 per cent. DULONG being the authority quoted by Professor BUNSEN and Dr. LYON, Playfair, in a report on Blast Furnaces (*see Report of the British Association for 1845*), would seem to be the best authority.

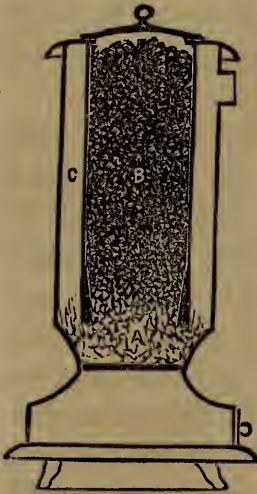
of producing. But as combustion is intensified in the common stove, even though it may have a "*feeder*" applied to it and be called a "BASE BURNER," it is only a part of the fire-pot that can by possibility become sufficiently heated to give to a small portion of the fuel, such an affinity for oxygen, that eight more parts may be taken into the combination, or, in other words, producing at that point, the center of the fire-pot only, a perfect combustion, while at all other parts of the fire-pot imperfect combustion will continue.

According to that law of chemical combinations which has been established since the world began, there is no intermediate combination in which six parts of carbon can combine with more than eight, and less than sixteen of oxygen. The two may be mixed in any intermediate proportion, but not as a chemical unity, and, therefore, no heat is produced by the mixture beyond the degree required to form carbonic oxide, unless at the expense of fuel, until the burning is at such an intensity (which it cannot be in the common stove, even though a "*feeder*" may have been applied) as will permit the second portion of oxygen chemically to enter into the combination.

Understanding these facts, it will readily be seen, that, with such stoves, the first stages of combustion can only produce carbonic oxide, and a low degree of heat; and that this is always the case, both when starting the fire and when replenishing with fresh fuel, until the whole quantity is fully ignited, after which, if the depth of coal is not too great, the product passing from the center of the fire-pot may, by possibility, be carbonic acid, but it can only be so at that point, for the reason that the exterior coal resting against the sides of the fire-pot, and being in no way affected by the heated coal contained in the "*feeder*," is cooled, so that it cannot take up the second portion of oxygen; resulting, temporarily, in a loss after starting the fire, as well as after replenishing with fresh fuel, at all parts of the fire-pot, to the extent of eighty per cent, if Dulong was correct in his estimate, and at all times to the same extent, from all portions of the coal ignited which is below the temperature required to permit the full proportion of oxygen to combine with it.

This is a fair statement of the case, being simply truisms well known to experts in such matters since the philosophy of combustion was reduced to a science; and it has also been as clearly known to the scientific world, that the common "*up draught*" stove originally intended for burning the various kinds of friable and tender fuels which contain a large portion of oxygen as a component part, was an unsuitable adaptation for burning a solid fuel, containing but little or no oxygen. Hence the theory, that, to produce an economical combustion of a compact fuel, *it must be so heated before it reaches the place of combustion*, as to give it an affinity for oxygen, and afterward meet it inversely, permitting the gaseous products to pass off sidewise, in order to more completely saturate the carbon with oxygen from the air—the supporter of combustion—or, in other words, to insure a more perfect combustion.

Out of this theory grew the "*Magazine Stove*," composed of three active parts or elements, viz. :



A fire-pot (A) or place where the fuel is burned, overhung by a magazine (B) to contain a supply of reserve fuel, and a surrounding chamber (C) made vacuous by its connection with the chimney flue, and through which the products of combustion were transmitted, known only as a "*Magazine Stove*," prior to the date of my inventions.

An expert, speaking of such construction as a principle, or mode of operation, would say, that, inasmuch as it was intended to contain an oversupply of fuel, its action was intended to be regulated by the air supplied at the base, and so constructed as to ignite but little fuel, and burn it at a more elevated temperature, and that the primary object of such construction, *was to prepare the cold fuel for a more perfect combustion by heating it, and thus giving it a greater affinity for oxygen before it should descend to the place of combustion*. A purpose far different from that of suspending a small tube over a fire-pot to serve simply as a "*feeder*," or to so construct a magazine that it can *only* contain the *solid*

fuel, and permit the volatile to pass off through its sides, or from its open top, and go to waste.

It must be apparent that nothing could be more simple than to put the stove above represented in operation; only requiring the necessary kindlings in the fire-pot, the magazine filled with fuel, and the fire lighted by holding a lighted taper in the ash pit so that the flame would be drawn up through the grate at the bottom, igniting the kindlings, and they in turn the solid fuel, the products passing through the chamber surrounding the magazine to the chimney flue.

Stoves of this character were constructed in England many years ago; and many will remember that substantially the same construction was manufactured and sold at Albany some 30 years ago, by the late Dr. NOTT, and known as the "NOTT STOVE."

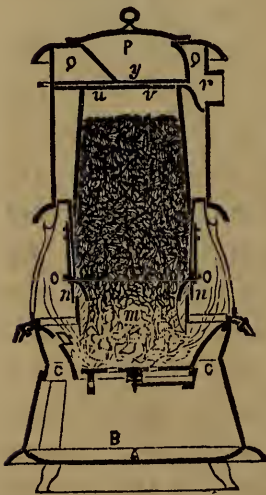
It is well known that the "NOTT STOVE," notwithstanding its great popularity at the time, and for several years afterward, was practically a failure, and long since ceased to be regarded as of value. One of the works of this truly great man, was an attempt to teach the people how to burn coal, and it is to him I am indebted for my own information on this subject, far more than to all other persons; but his stove, like those that had been made before that time, having one great defect which its constructor failed to discover, was compelled to succumb at last, and, like its predecessors, be known in the books only, which lie dusty with age upon the shelves of our libraries.

The "NOTT STOVE," as also the original *magazine burner*, was intended to ignite but little fuel, and to burn it at a high temperature regulated by the supply of air at the base, but it was faulty in that it afforded access to air, also from above entering the magazine through the unavoidable crevices around its cover, and passing thence downward through it to the fire. This downward current was increased both in volume and rapidity by reducing the supply at the base, and could be checked only by the objectionable means of partially closing the smoke-pipe. The disturbance thus introduced, precluding any effective control of the action of the stove, was itself sufficient to insure its ultimate failure. At least this was my theory at the outset; and time has proved that it was a correct one.

If it be asked why it was with such stoves that more or less air was constantly passing down through the supply coal, the reply is by referring to the fact that to heat a combustible is to give it an affinity for oxygen so that air is drawn toward it; and the fuel being cold when placed in the magazine, its interstices were unavoidably filled with atmospheric air. The fuel in the fire-pot being heated, such air was attracted to and passed to the fire-pot. And as the cover opening to its magazine could not be made absolutely air tight, more or less air would pass in under it to fill the place of that among the supply coal *which necessarily passed to the burning fuel*. Hence it will be seen, that, with such constructions, there was at all times more or less atmospheric air mingling with the supply coal, *and from that direction*, passing to the fire-pot, when it should only have been permitted to pass thereto at the base.

As the objects of my inventions have been to improve and make valuable this class of stoves, it follows that my stoves employ the same elements, viz.: A fire-pot, overhung, not by a simple "feeder," but by a *preparing magazine for reserve fuel*, and a vacuous chamber to receive the products of combustion from the fire-pot and transmit them to the chimney flue, varying in their combination from the stoves referred to, in that said chamber is so constructed as to inclose the cover opening to the magazine.

THE MORNING GLORY.



It will be observed that in this stove the exterior chamber incloses the cover opening to its magazine, forming by means of the exit flue leading to the chimney, a vacuous chamber to surround said cover, and thereby insure the proper action of the stove. When thus constructed, it is impossible for any atmospheric air which may find its way into said chamber, to gain access to the magazine, for the reason that the vacuous space thus formed by the chimney flue has more power to draw it in that direction, than the heated fuel has to take it in under

the cover to its magazine.

In the practical use of THE MORNING GLORY, it has been found that its great utility consists *in its ability to accumulate within its magazine, a volatile combustible*, taken up from that portion of the fuel highly heated, but not in a state of ignition. Such accumulation from the fullness of the magazine passes down to the fire-pot, where it meets the air coming up through the grate, at the base, when its combustion takes place. *Intensifying the heat at that point, and causing the coal at the base, and at the exterior surfaces, to be the first portions consumed to ashes, making, in fact, a BASE BURNING STOVE.*

To exhibit more clearly the difference in the action of THE MORNING GLORY, and the before mentioned constructions, it may be said that in starting the fire, they are identical. So, too, with the condition of the supply coal when placed therein, in each having its interstices filled with atmospheric air which passed therein with the coal. So, also, that the air among the supply coal is attracted to, and passes to the burning fuel. At this point the parallel ceases; and for the reason, that there is a radical change in their construction. With the former, a new supply of air would pass into its magazine under the cover opening thereto, more or less, in proportion to its tightness; whereas, with THE MORNING GLORY, none can pass therein, simply for the reason that the chimney flue has more power to take it in that direction than the heated fuel has to take it in under the cover to its magazine.

The practical advantages of THE MORNING GLORY will be appreciated when it is understood, that, inasmuch as the before mentioned constructions could not be regulated by the air supply at the base, they could not be made to burn continuously, for the reason, that the air, more or less, passing down from the top caused combustion to take place *at the center of the supply coal, and at a point remote from the base*, thereby causing ashes and slag to accumulate at a point far above the base, so that, in a short time, the fire-pot would become clogged with refuse matter and half burnt coals, which could not be removed without first removing the partially consumed coals upon the grate. Whereas, with THE MORNING GLORY, atmospheric air can only reach the magazine when supplying coal thereto, and which

passes to the burning fuel, the chimney flue, by its connection with the chamber surrounding the magazine, preventing the passage of air thereto, when the stove is in operation, so that the magazine (atmospheric air being excluded) *becomes a perfect receiver*. Receiving from the heated fuel a volatile product, which is combustible; filling the interstices of the supply coal with such combustible, down to a point in the fire-pot where it meets the air coming up through the grate, where it burns, causing active combustion at the base and the exterior surfaces, and, as before written, converting the "*Magazine Stove*" into a **BASE BURNING STOVE**.

The **MORNING GLORY**, is an engine of combustion, composed of certain correct principles of construction, the object of which have been to produce what should be in fact a *Base Burning Stove*. That it has been brought to a high state of perfection, all will admit. And that such a stove must necessarily be economical, must be self-evident; for as the candle when neatly trimmed, gives more light as the result of a more perfect burning of its carbon, so will Anthracite give more heat, when its carbonaceous properties are more thoroughly consumed.

It will be observed that I was the first to so organize the *Magazine Stove*, that it could burn *at the base only*. And having accomplished this, together with further invention relating to this class of stoves, I sought for a term to distinguish my inventions from those which were old and well known. Hence originated the term "*Base Burner*." It was supposed that I should be able to enjoy the exclusive right to use this term as a **TRADE MARK**; but it was afterward found that the **LAW** in that respect, did not protect the right to use any words as a **TRADE MARK**, that are descriptive of the article to be sold under it.

The purpose of this pamphlet is to impart certain facts relating to my inventions, to which the public are entitled. As to the terms "*Base Burner*," and "*Base Burning*," there is probably no words in the English language so improperly used as these are at the present time, and it is but a simple act of fairness on my part, to ventilate this matter. It is true that my *legal right* is not infringed when other manufacturers, influenced by their popularity, make use of these terms. But when they are applied,

as is the case, to stoves, that in principle of construction were in existence prior to the date of my inventions; and to those that made no pretensions as BASE BURNERS, then injustice is done. No stove which employs a magazine, simply to serve as a "feeder" to supply coal to a fire-pot, is, or can, with truth, be called a BASE BURNER. And certainly, a stove, that will permit all the coal contained in its magazine to become ignited, or a stove that does not employ my inventions, has no moral right to put on the habiliments of a BASE BURNER, and claim popular favor for that reason.

A BASE BURNING STOVE is precisely such a stove as I have described it; and every stove claiming to be such, which does not correspond with this description, assumes to be what it is not.

The heating power of a BASE BURNING STOVE depends upon the size of the MAGAZINE, and its proper adjustment to the "FIRE-POT" or "FURNACE" *below* it. These two elements should be so adapted to each other as to ignite but little coal, compared with the quantity the magazine is to contain. The magazine *must be practically air-tight*, so that it may be filled, not only with coal, *but with gases generated therefrom*. The magazine and furnace should be so adapted to each other as to make it necessary to build the fire *below the magazine*; when, as the coal is consumed, that above settles, not out laterally as in the "Bogus" BASE BURNERS, but *down* as in the MORNING GLORY, to supply its place. With such an organization, a fire may be started with the frost of autumn, and supplying the magazine and shaking down the ashes daily, will continue for the winter. A "millgrate" (used in no other stove beside the MORNING GLORY) will grind up the matter that cannot be burned; and if the lower end of the magazine (which must necessarily be the most intensely heated part of the stove) is composed of fire-brick, or some other non-combustible and slowly conducting material, the coal will be perfectly consumed; giving all its heat, and none going to hodsfull of cinders and half-burnt coal, as it does in the "Bogus" BASE BURNERS, where the fire-pot *alone* is the seat of power; and the magazine is used *only* as a "feeder;" and is composed of *cast iron*, which melts at a temperature far below that produced by the *perfect combustion* of anthracite.

THE MORNING GLORY OF 1868.



IN THIS PATTERN OF THE MORNING GLORY, several new and important features have been embodied, added to which is my recent invention of a *new mode* of constructing its case; forming it of doors, hung by a concealed hinge, and so that they may be dropped to a horizontal position upon every side, when required for mounting them with mica, or for cleaning the mica when the stove is in operation. This new case can only be seen to be admired. This stove, like the stove of 1866, is made entirely of cast iron, so fitted as to be air-tight, but can be made with sheet iron upper section when preferred by the purchaser. Its ornamental finish is drapery, making it a handsome piece of furniture, far more so than any stove heretofore made. Its internal construction, though resembling some of the former patterns of The Morning Glory, is quite different, making it more durable, and far less difficult to be repaired. The castings are of the highest order, fully equaling the finest castings made in this country.

When constructing the patterns for this stove, and the alterations of this season, they were so made that sheet iron might be used as heretofore; but the writer is of the opinion that there are many reasons why the cast iron top is preferable. The non-liability to rust, the safety in shipping and handling, the increased heating surface, declare for the cast top, which made its first appearance upon the MORNING GLORY OF 1866. Besides this new mode of manufacture, this stove is full of novelty, leading to simplicity of construction; so much so, that any person can replace the parts destroyed by fire, without the use of any tools, except a screw driver to draw the short bolts holding the top plate in place; the removal of which, permits all the interior parts to be removed and replaced by any person, however unskilled.

HOW TO USE THEM.

See that they are perfect; that the mica windows are properly fitted, and that the dust register *is closed*. See that the pipe is properly fitted, and that there is no other opening to the same flue left open.

STARTING THE FIRE.

Proceed as with any stove, have it burn slowly at first; leave the reservoir cover open when igniting the kindlings to avoid smoking the windows. Supply hard coal at first in small quantity, and when once ignited, fill the reservoir full and close its cover, *and keep it closed at all times*, except when it becomes necessary to supply coal. If this cover is left open, or opened to hasten the action of the stove or furnace, it permits the whole mass of coal to become ignited,

SPECIAL!!!

and will destroy the interior portions of the stove by burning them up, and cause the coal to waste away the same as in a common stove.

ESCAPE OF GAS.

To refill with coal, which should be attended to before all the coal in the magazine has become ignited, the reservoir cover should be first opened. This cuts off all communication between the smoke pipe and fire pot, and at the same time forms a direct communication between the opened top of the magazine and

the chimney, so that the retained gases instantly pass thereto, when the outer cover may be safely opened. After supplying coal, first close the outer cover, then the reservoir cover. This organization, found necessary to prevent the escape of gas to the room when supplying coal, was patented in December, 1862. The MORNING GLORY is the only stove in market in which it is employed. There are other stoves in market, that, by a jesuitical method of advertising, would have it appear that this invention is therein employed. Such pretense, so far as the public are misled by it, is simply a fraud.

REKINDLING.

When the fire is out from neglect to supply coal, do not dump the grate, but shake out the ashes, and kindle on the old coal the same as on the grate in the first instance, which can be done with ease, unless the quantity remaining more than fills the pot, in which case, shake out a portion until the depth is only from four to six inches, which will ignite from the top and burn down to the bottom.

PERPETUAL BURNING.

To keep the fire over night, shake out the ashes and slag by means of the "MILL GRATE,"



which is not used in any stove excepting THE MORNING GLORY. See that the reservoir is well supplied with coal, and that the dust register is closed. Nearly close the draft registers, and open the cold air regulator on the top cover, as may be required

by the draft of the chimney, so as to permit cold air to pass in at the top, which will cool the stove and cause the coal to burn slowly during the night, and the fire to be in fine condition in the morning.

SIZE OF COAL.

Small coal must be used: Say for stoves Nos. 20, 21 and 22, Chestnut or Nut size; 23 and 24, Nut size; 25, 26, 28, 30, and 32 Small Stove size. Never select the size of coal by looking at the grate; it being a "MILL GRATE," and not open across its entire surface, permits a large opening at the center. More coal will pass through the grate and be wasted when too large for the size of the stove than when it is quite small, owing to the fact that, if the coal is too large, combustion ceases after a time, immediately above and upon the grate; and such imperfectly burned coals are milled through with the ashes and slag; if it be of the proper size none will pass through after starting the first fire.

NAMES NOT TO DESIGNATE THE SIZE *of coal in all cases.* These directions are adapted for the city of Albany; adopting the names used by coal dealers to indicate the sizes of coals sold by them; but, inasmuch as in various parts of the country, the name used here would sometimes give a larger size, the annexed cuts are given to show the proper size, so that parties using these stoves can select the size required, by referring to the cuts which are of the exact size best adapted for The Morning Glory Stoves.



SMALL EGG, OR STOVE SIZE.



NUT SIZE.



CHESTNUT SIZE.

INTRODUCTION.

Fifteen years ago the writer came to Albany, a city somewhat celebrated for its extensive stove manufactories. At that time BASE BURNING STOVES were practically unknown to the people of this country. My first attempt, which was in 1853, to produce such a stove will be remembered by many, also the result of such effort. Also, that in 1854, '55, there was no stove so odious and little cared for by manufacturers of stoves, as "THE LITTLEFIELD STOVE," being universally condemned by them as unfit to be made. But while these things will be remembered, it will also be remembered that I was of the opinion, and so acted, that the BASE BURNING STOVE should finally be the most popular stove in market. And, while those who are now following in my wake were laughing at my attempt to resuscitate a principle so clearly dead, *in their opinion*, I continued my efforts to perfect this most valuable stove, and to find parties who would engage with me in their manufacture. In 1855 not a single Base Burning Stove was made in this country, except by myself, and for experimental purposes; but, in 1856, I succeeded in making an arrangement with a well known house at Albany, but, outside of the regular stove makers; when I began to succeed. From that time until now BASE BURNING STOVES have been growing in public favor, and, so much so, that a large number of the stove makers have discovered that such stoves have indeed become very popular, and that it will pay to have in their sample rooms *some kind of a stove* which they can call a "BASE BURNER," which is easy to accomplish, it being an easy matter to copy some old English or French stove, or apply a "*feeder*" to the common stove, and by mixing with such an idea a moiety of my thunder and calling them "BASE BURNERS," they will sell, as a matter of course, and for the reason that the great mass of community have a very imper-

fect knowledge of the principles of construction necessary to be embodied in the production of a truly BASE BURNING STOVE.

It is ludicrous to hear some of these manufacturers talk. They "have always been opposed to BASE BURNING stoves;" have "thought, and still think them wrong in principle;" but as there is a "great demand for BASE BURNERS, feel compelled to make them." And more ludicrous still, to see how easy some of these manufacturers, without any experience in such matters, can get up "*a perfect*" BASE BURNER. More so to me, being so unfortunate as to have worked diligently in this matter for fifteen years, and can still see chances for improvement. But the most laughable incident connected with these so called BASE BURNERS occurred some two months since at Troy. Being informed that a responsible house of that city were getting up a stove that was to resemble the MORNING GLORY, I called upon them; and making known my business, was assured that I would have no cause to complain; as they should take particular pains to avoid infringement. And evidently with a purpose to doubly assure me, explained that neither of their firm had a knowledge sufficient to get up a BASE BURNER; but to comply with the demands of their customers, they had concluded to make one. That they had consulted Mr. ———, pattern maker (of Troy), who assured them that he knew how to make such a stove without infringement; and that they had employed said pattern maker to get them up such a set of patterns. Their explanation was satisfactory; and I could but admire their frankness, but at the same time I could but think that these gentlemen should either pursue their ordinary business, or learn what a BASE BURNING STOVE really is, before undertaking their manufacture. With their knowledge on the subject, it is very evident that they will be ready, as others have, to cry "EXCELSIOR" or "MORNING LIGHT," if they even succeed in keeping fire over night.

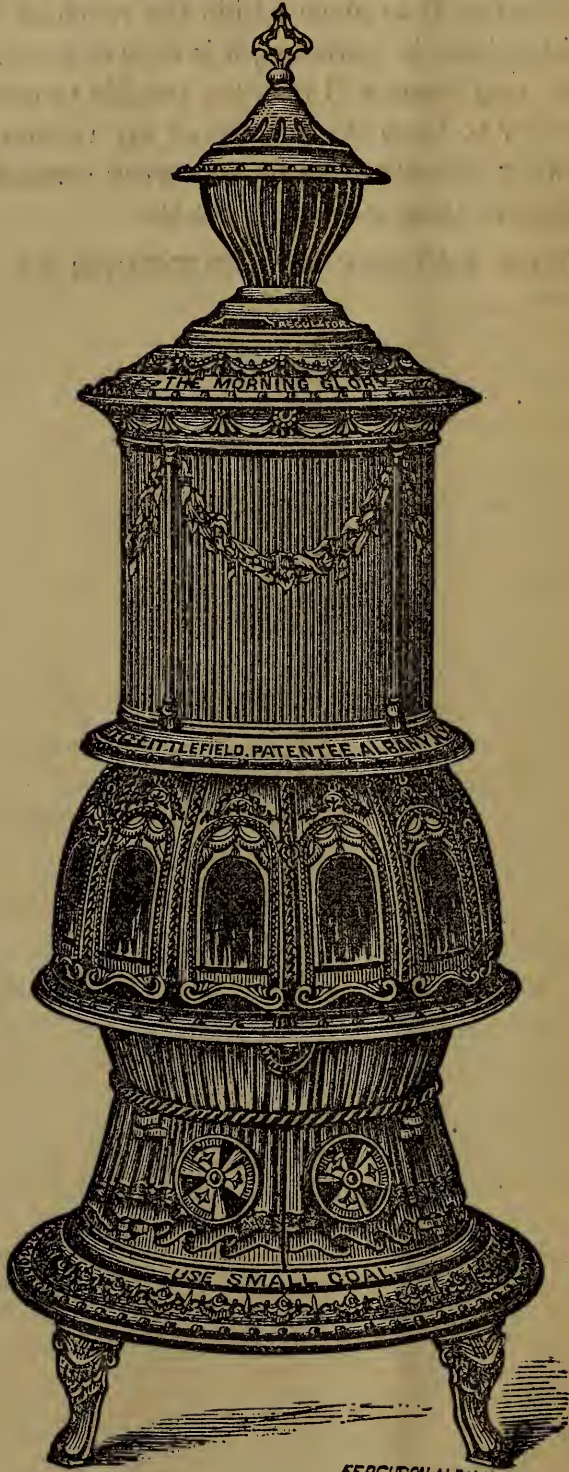
I am aware that it is not in good taste to deal in personalities, and the reader should not so regard these remarks. I have some rights; and if I let matters go on without protest, I shall, myself, be regarded as an interloper; having no rights that STOVE MANUFACTURERS "are bound to respect."

My purpose in publishing the patents relating to the MORNING GLORY STOVES, is to place within the reach of all, information that will at least be harmless, if it does no good. But I am in hopes that very many will take the trouble to examine them, and with a view to learn the purpose of my various inventions.

The following patents refer to, and were granted for, inventions embodied in these stoves. First the

LETTERS PATENT OF DECEMBER 9th, 1862.

THE MORNING GLORY OF 1868.



No. 2612.

THE UNITED STATES OF AMERICA.

TO ALL TO WHOM THESE LETTERS PATENT SHALL COME :

WHEREAS, DENNIS G. LITTLEFIELD, of Albany, New York, has alleged that he has invented a new and useful Base Burning Stove (for which Letters Patent were issued to him dated December 9, 1862, and antedated November 26, 1862, which letters having been surrendered by him, the same have been cancelled, and new letters ordered to issue to him on an amended specification), which he states has not been known or used before such invention ; has made oath that he is a citizen of the United States ; that he does verily believe that he is the original and first inventor or discoverer of the said invention, and that the same hath not to the best of his knowledge and belief been previously known or used ; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents praying that a patent may be issued therefor.

These are therefore to grant according to law to the said DENNIS G. LITTLEFIELD, his heirs, administrators or assigns for the term of seventeen years from the twenty-sixth day of November, one thousand eight hundred and sixty-two, the full and exclusive right and liberty of making, constructing, using and vending to others to be used the said invention, a description whereof is given in the schedule hereunto annexed and made a part of these presents.

In testimony whereof, I have caused these Letters to be made Patent and the seal of the Patent Office to be hereunto affixed. Given under my hand at the city of Washington, this fourteenth day of May in the year of our Lord [L. s.] one thousand eight hundred and sixty-seven, and of the independence of the United States of America the ninety-first.

W. T. OTTO, *Act. Sec'y of the Interior.*

T. C. THEAKER, *Commis'r of Patents.*

Countersigned and sealed with }
the seal of the Patent Office. }

Fig. 1.

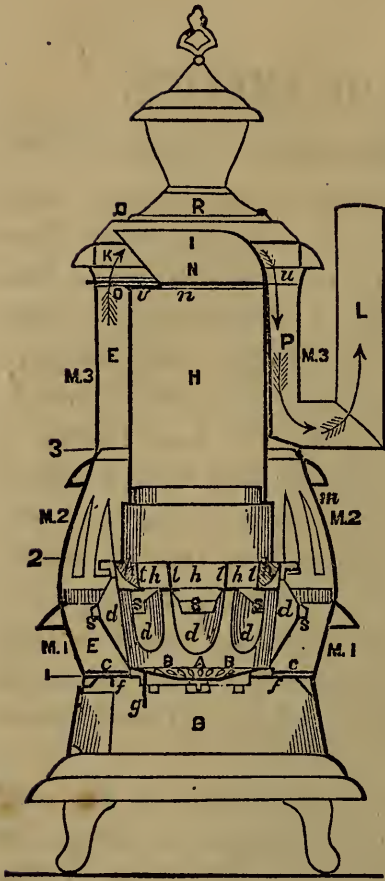


Fig. 3.



Fig. 4.

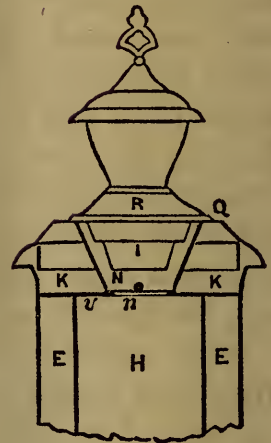
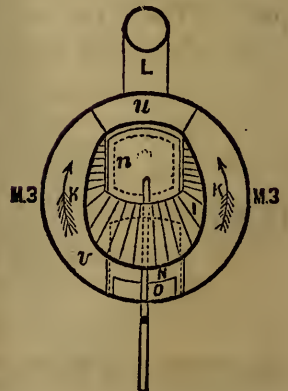


Fig. 2.



Fig. 5.



UNITED STATES PATENT OFFICE.

DENNIS G. LITTLEFIELD, OF ALBANY, NEW YORK.

Letters Patent No. 37,103, dated December 9, 1862; antedated November 26, 1862; reissue No. 2,612, dated May 14, 1867.

BASE BURNING STOVE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN :

Be it known that I, DENNIS G. LITTLEFIELD, of the city of Albany, and State of New York, have invented certain new and useful improvements in a well-known class of stoves, which I denominate Magazine Coal-Burners; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section central from front to back of a burner comprising my invention.

Figure 2 is a transverse section at line 1 of fig. 1, showing the annular floor $f f$ of the hollow space E E E, enclosed by the outer case M M, fig. 1, and also what I call the mill-grate B A B.

Figure 3 is a transverse section of the part of the burner between line 1 and line 2 of fig. 1, where combustion takes place, and which I call the furnace, directly over which is placed what I call the fuel-magazine H, fig. 1.

Figure 4 is a vertical section, central from side to side of the upper part of the burner, showing more distinctly its structure.

Figure 5 presents an open view of the part of the burner above line 4, fig. 1, showing its internal structure.

The object of my invention is so to construct these invaluable burners as to bring into more effective operation certain principles of dynamics and esthetics conducive to their design, and thereby the more perfectly to adapt them to their purposes; and I now proceed to point out their defects and imperfections, and to describe the devices by which I propose to remedy them. Those who are familiar with my further inventions made since

the date of my patent of 1862, of which this is a reissue, will not fail to see in the inventions intended to be secured by that patent, as herein more fully and exactly described, the origin and beginning of the series of original inventions which culminated in "The Morning Glory of 1866." The effective elements which characterize this class of burners consist of, first, the apparatus for burning coal, which, as already stated, I denominate the furnace; secondly, the fuel-magazine; and thirdly, the surrounding hollow space through which the heat generated by combustion, circulates, and from the surfaces of which it radiates to produce the desired warmth.

First. The air-supplying grate at the bottom of the furnace ought to be so constructed as to allow the removal therefrom of the slate and other incombustible substances which accumulate therein, without extinguishing the fire.

Second. When, as in the burner shown in the drawings, the furnace is surrounded by the same chamber which receives the heated products of combustion therefrom, more direct and enlarged radiation from the burning coal would be highly beneficial by increasing the heating power, and by the more equal diffusion of heat through the surrounding chamber.

Third. To the same end, and that more heat may be communicated to all parts of the surrounding chamber, the outer case requires to be so constructed as to become more intensely heated, both by the direct radiation from the furnace, and from the hot products of combustion proceeding therefrom, and diffusing themselves over the interior surface of the case.

Fourth. For the double purpose of securing a better outer illumination, and a more beneficial diffusion of the heat radiating from the outer surface of the case, it is important to give to it such a form and so to dispose the windows that the light may be reflected upward, as well, to a sufficient extent, horizontally, and that a portion of the heat should be reflected downward.

Fifth. Coal-burners of this class, when in operation, generate and retain in their fuel-magazine highly inflammable mixtures, varying in quantity according to the quality of the coal and to the proportion of moisture it contains; and the sudden intermixture of these gases with atmospheric air will cause explosions.

Hence it becomes important, when the magazine is to be opened for the purpose of replenishing it, first to free it from such gases.

Sixth. The burner should be so constructed that when in operation no atmospheric air can enter the fuel-magazine; and to this end some provision is indispensable for carrying off, through the exit flue, any air that may find entrance at the top of the burner.

Seventh. The burner should be so constructed that the hot products of combustion emitted from the furnace shall have room for immediate expansion; that they shall be retained at the point of expansion long enough to part with a large share of their heat; and that they shall then pass upward into a gradually contracting part of the chamber; because, by this means, they will be made to impart an increased and more uniform degree of heat to the transmitting case.

Eighth. For the purpose of giving to the burner the highest degree of efficiency, and of saving fuel, it should be so constructed that the hot products of combustion will be forced into full contact with all parts of the surrounding case throughout its whole extent, including its front and its extreme upper and rear portions, and then be turned downward to the exit flue.

Ninth. When to be used for warming the apartment in which it is placed, the burner should be so constructed as to transmit the largest share of its heat from the front, and a portion of it toward the floor of the apartment.

Tenth. When to be used for the last-mentioned purpose, the burner should be so constructed that bits of coal accidentally dropped upon the floor, or any refuse matter, may be readily and conveniently got rid of by depositing them in the magazine; and for this purpose should be provided with a sliding cover over the magazine, upon which, on opening the outer cover, such bits of coal or refuse matter may be thrown, and, after replacing the outer cover, be projected into the magazine by simply drawing the sliding cover.

I proceed next to specify and describe more particularly the devices by which I propose to accomplish the useful purposes I have enumerated.

Figure 1 of the accompanying drawings represents the burner from base to apex, inclusive. The base contains the ash-pit G, with one or more doors having register openings to regulate the admission of air to support combustion, and may also, at pleasure, be furnished with an ash-pan. My purpose in contracting the diameter or the base gradually upward is to facilitate the enlargement of the outer case opposite to the furnace; the great utility of which will be pointed out in the sequel. At line 1, fig. 1, the furnace D rests upon and is supported by an angular plate, *f f*. This plate is held in place by brackets projecting under it from the inner sides of the plates forming the ash-pit. The plate *f f* has resting upon it plate *c c*, encircling the bottom of the furnace, and having openings through it corresponding with openings in the plate *f f*, and being movable by a lever inserted in a socket, *g*, therein. The two plates together form a register, whereby a passage may, at pleasure, be opened from the ash-pit to the chamber E E E. This register is subservient to three purposes: to carry off, by means of the draught upward through it when opened, the floating dust while shaking down the ashes and slag from the furnace; to cool the burner, when overheated, by the admission of a current of cold air into the chambers E E E, the doors of the ash-pit being in the mean time open; and to let out the ashes carried into this chamber by the current through the grate at the bottom of the furnace, and deposited on the register, which, as it will be seen, forms the floor of the chamber. The mill-grate B A B, fig. 1, is constructed as follows: It consists of two parts. Its central part A is fixed, and has bars *a a* projecting from its periphery, as shown in fig. 2. Outside of this part there is a movable annular grate, B B, having a reciprocating movement around it. Projecting from the inner periphery of this grate, towards and nearly to the projecting bars *a a* above described, there are similar bars *b b*. This outer grate is rotated by means of a lever inserted in the usual manner, by which process slate and other incombustible matter is broken into small pieces between the bars *b b* and the bars *a a*, and falling through the grate is thus eliminated from the furnace without emptying it. The whole grate combined, however, is, or may be, made to tilt

in the usual manner. It is made, in a greater or less degree, concave, in order that the incombustible matter may, in the process of grinding, move towards the centre. If thought advisable, the outer periphery of the grate B A B may also be denticulated-notched, as shown in fig. 2. The lower part of the furnace is so shaped as to form mouths or combustion outlets *dd* around its whole periphery, flaring outward from the bottom upward, as shown in figs. 1 and 3, instead of side perforations heretofore used in several well-known stoves of this class, in which the furnace is surrounded by the same chamber which receives the products of combustion evolved from the burning fuel. The number of these outlets varies according to the size of the furnace. Over and partially within them are placed bars *h h*, fig. 3, of soap-stone or other suitable material, directly upon which rests the fuel-magazine H, fig. 1. These bars are severally held in place by thin plates *t t*, forming a part of the iron casting or otherwise affixed to it, and project upward between the ends of the bars, as shown in fig. 1, so that the bars are severally removable for repairs without injury to the rest. These bars forming a bridge, as it were, across the outlets, and running in direct line from point to point, tend to enlarge the outlets and to increase the radiation upward from the burning fuel to the chamber E E E, while at the same time they serve to contract the outlet from the magazine H, as shown in fig. 1, and by affording a partial support to the reserve coal, to prevent it from pressing too heavily upon the coal at the point where the most active combustion is intended to take place, which being thus left free from undue compression, radiates an intense heat upward and outward. The outer sloping sides of the combustion outlets are lined with soap-stone or fire-brick, either at the top only, as shown in the drawings, or entirely from top to bottom, as may be preferred. They may also, for greater durability, be lined on the sides, and even the whole interior may be lined throughout with soap-stone, fire-brick, or other slowly-conducting material. The direction given to these outlets being such as to permit the radiation of heat to the upper portions of the chamber E E E, while the surface radiation is to the lower part of the chamber, the action of the heat

evolved is rendered more effective, and a highly beneficial result, otherwise unattainable by means of such inclosed furnaces, is obtained. The magazine H may be cylindrical, as shown in the drawing, and should rise to such height as to give to it the requisite capacity, if replenished morning and evening, or twice, at nearly equal intervals, in twenty-four hours, to insure a uniform, uninterrupted, and sufficient supply of fuel, already heated (as it must be in any burner), in its gradual descent to the place of combustion. The burner is covered at the top by the plate Q, fig. 1, having a large central opening closed by the cover R. The top of the magazine H is covered by the plate *v*, which forms the floor of the chamber I, fig. 4. It extends beyond the margin of the magazine to the outer case, and thus becomes the floor also of the horizontal flue K formed by the extension upward of the exterior case, the walls of the chamber I, and the top plate Q in contact with them. This flue is connected with the chamber E E E by the aperture *o*, figs. 1 and 5, through the front part of the plate *v*, and passes on each side of the chamber I, from this aperture to the descending flue P, fig. 1. The flue P is connected with the plate *v*, and extends downward at least somewhat below the top of the magazine H, and there connects with the smoke pipe L, thus perfecting a continuous passage from the grate at the bottom of the furnace to the smoke pipe. The plate *v* has a large aperture, *n*, fig. 5, from the chamber I, through which coal is supplied to the magazine. It is closed by a sliding cover, N, fig. 5, and corresponding in width with the aperture *o*, closes it when drawn forward to open the aperture *n* to replenish the magazine, and thus shuts out the heated products of combustion from the flue K, and turns them back to find a new passage up through the magazine to the chamber I, and thence over the back wall of this chamber, cut down for the purpose, to the exit flue P, whence, the outer cover R, fig. 1, remaining in the mean time closed, they pass off without danger of explosion. But although the primary object of this arrangement is to guard against puffs and explosions on opening the magazine, there are also other important advantages secured by it: First, the heated products of combustion are brought, by means of it to the front of the burner on their

passage to the flue K, instead of being carried, as they otherwise would be, in undue proportions in their direct passage from the chamber E E E to the rear, where heat is less needed, and its radiation would generally be impeded by proximity to a warm chimney or wall, and a portion of it consequently lost. This construction, it will therefore be seen, is conducive to a better diffusion of heat, and to an increase of its efficiency. Secondly, the gate-like cut-off or sliding cover N is highly conducive to convenience by affording an easy mode of conveying, from the chamber I to the magazine, whatever it is desirable so to dispose of, thus avoiding the necessity, otherwise unavoidable, of raising two covers to gain access to the magazine, or of opening a door and then lifting a cover to accomplish the same purpose. The outer case in its ascent above the line of its broadest expansion opposite to the furnace, it will be seen (fig. 1), deflects gradually inward, assuming a dome-like form until it reaches the point at *m*, and thence continues with a gradually diminishing diameter to its upper termination. The beneficial effect resulting from this form is threefold: first, by the inclination thus given to the case it is brought more nearly over the furnace, and the heat and light thrown obliquely therefrom strike more nearly at right angles upon the surface of the case, and consequently with greater force and effect than if the case rose perpendicularly; secondly, the broad extension of the lower part of the case affords ample room for the required expansion, and its immediate contraction secures the requisite detention (as already explained) of the hot products of combustion proceeding from the furnace; and, lastly, the whole structure is made to present itself to the eye under a graceful and beautiful form.

Those skilled in the art will, I trust, readily see the best modes of carrying my invention into practice, and I will now proceed to explain the management and operation of a stove such as I have described it.

Preparatory to kindling the fire the sliding cover N is to be drawn forward, as shown in fig. 5, for the purpose of giving exit to the smoke through the magazine H, and thereby preventing it from sullyng the windows. After lighting the kindlings and

leaving them to burn long enough for their smoke to pass off, the magazine H is to be filled with coal and the cover N returned to its place. As combustion proceeds all the coal up to a line just above the outlets *d d* becomes ignited. The products of imperfect combustion, as they accumulate in the magazine H, pass downward to the outlets, where they burn, and thereby aid in keeping up a vivid combustion at that point, while, by their close proximity to the incandescent coal upon the grate B A B, they help also to maintain combustion there, and having been thus utilized and spent, they pass to the enlarged part of the chamber E E E. Here all the hot products of combustion issuing from the furnace expand, and having, during their detention, expended a share of their heat and become contracted in volume, they pass thence up into the remaining space around the magazine, and to the front of the burner, and through the aperture *o* to the flue K, and thence along both sides of the chamber I, and in contact with the top plate Q, to the rear of the burner, thence turning downward to the flue P, fig. 1, they pass off through the smoke pipe L. As the process of combustion advances the power of the burner is gradually evolved in all its surpassing force, conducting, radiating, and reflecting heat from all its surfaces. From the flaring portion of the case M¹, the heat radiating in a direct line from its surface warms the floor of the room throughout a circle described by a line running from the upper extremity of the flaring surface at right angles with it to the floor. From the part of the surface next above to *m*, fig. 1, by the leaning position given to the windows surrounding the case at the line indicated by M², fig. 1, they are made to shed their light upward, and thus to illuminate the whole apartment.

What I claim as my invention, and desire to secure by Letters Patent, is —

1. The mill-grate B A B, constructed and operating substantially as and for the purpose herein described.
2. I also claim the flaring portion of the outer case M¹, in combination with the furnace D, substantially as and for the purposes described.

3. I also claim the furnace D, opening into and in combination with the chamber E E E, and so constructed as to emit both light and heat from the burning coal in an upward direction, substantially as and for the purposes set forth.

4. I also claim, in combination with the subject-matter of my third claim, the plates *f f* and *c c*, which form the floor of the chamber E E E, and a register opening from the ash-pit, substantially as and for the purposes set forth.

5. I also claim the compelling of the draught from the grate while the fire is kindling, and previous to and during the process of replenishing the magazine, to pass through the magazine for the purposes specified, by the means I have devised, or by any analogous devices.

6. I also claim the chamber I, communicating with the flue P, whereby air finding admission through the aperture over which rests the cover R, passes at once to the exit flue, as specified.

7. I also claim the divided flue K around the chamber I, and forming a communication between the chamber E E E and the flue P, whereby the products of combustion are drawn to the smoke pipe and chimney, and the heat rendered more effective by its proper diffusion within the burner, as herein set forth.

8. I also claim the plate *v*, forming the top of the magazine, and projecting out over it to the outer case, and having apertures *o*, at the front side, and another *u*, into the flue P, as described, substantially as and for the purposes set forth.

9. I also claim such an adjustment of parts of the magazine stove as will carry the whole volume of the heated products of combustion to the front region of the stove, and thence to the rear part of it over the top of the magazine, in the manner I have described, or by any other analogous devices.

10. I also claim the gate-like sliding cover N, in combination with the magazine H, as and for the purpose herein set forth.

11. I also claim the inward deflection of the case M², in its relation to, and combination with, the furnace and chamber E E E, substantially as and for the purposes set forth.

12. I also claim the window openings in the outer case at M^2 , in combination with the recession of the case, substantially as and for the purposes set forth.

DENNIS G. LITTLEFIELD.

Witnesses:

HENRY C. LITTLEFIELD,
EDM. F. BROWN.

The first editions of the Morning Glory Stoves, those made in 1861-2, and a part of those made in 1863, were strictly in accordance with the foregoing patent in all their parts, excepting the furnace; some of which had their fire-pots formed of vertical bars. All of those Stoves gave excellent satisfaction, though in some instances they did not heat sufficiently at their base; to remedy this, and in other ways obtain a more satisfactory construction, I devised the construction

PATENTED AUGUST 18, 1863.

No. 2881.

THE UNITED STATES OF AMERICA.

TO ALL TO WHOM THESE LETTERS PATENT SHALL COME:

WHEREAS, DENNIS G. LITTLEFIELD, of Albany, New York, has alleged that he has invented a new and useful Improvement in Base Burning Stoves (for which Letters Patent were issued to him dated August 18, 1863; the same surrendered, and new letters issued to him dated December 22, 1863; which last letters having been surrendered by him, the same have been cancelled, and new letters ordered to issue to him on an amended specification), and has made oath that he is a citizen of the United States, that he verily believes he is the original and first inventor or discoverer of the said improvement, and that the same hath not to his knowledge and belief been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents praying that a patent may be issued therefor.

These are therefore to grant to the said DENNIS G. LITTLEFIELD, his executors, administrators, or assigns, for the term of seventeen years from the eighteenth day of August, one thousand eight hundred and sixty-three, the full and exclusive right and liberty of making, using and vending to others to be used, the said improvement, a description whereof is given in the annexed schedule, and made a part of these presents.

In testimony whereof, I have caused these Letters to be made Patent, and the seal of the Patent Office to be hereunto affixed. Given under my hand at the city of Washington this twenty-fifth day of February, in the year of our [L. s.] Lord one thousand eight hundred and sixty-eight, and of the independence of the United States of America the ninety-second.

W. T. OTTO, *Acting Secretary of the Interior.*

A. M. STONE, *Acting Commissioner of Patents.*

Countersigned and sealed with }
the seal of the Patent Office. }

Fig. 1.

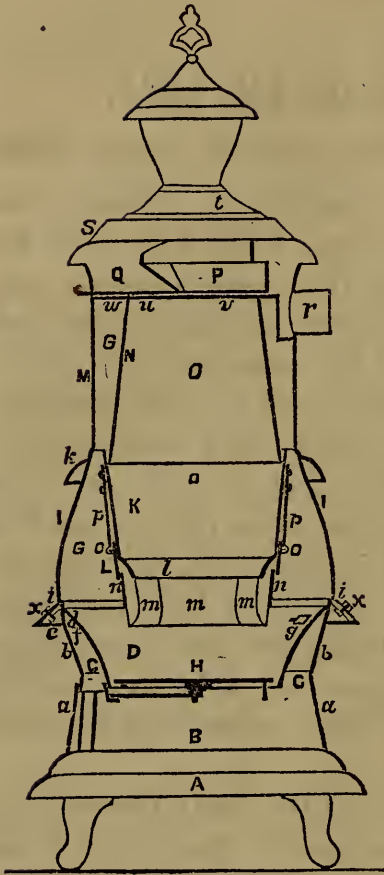


Fig. 3.

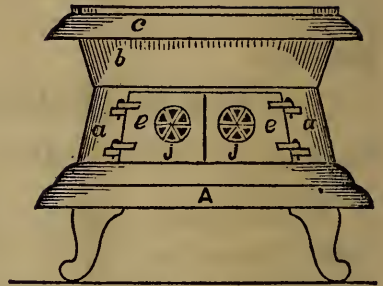


Fig. 4.

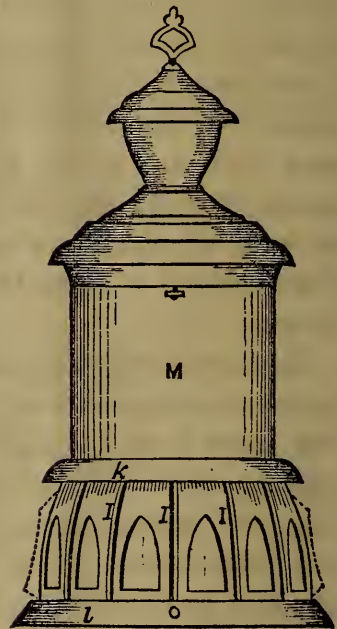


Fig. 2.

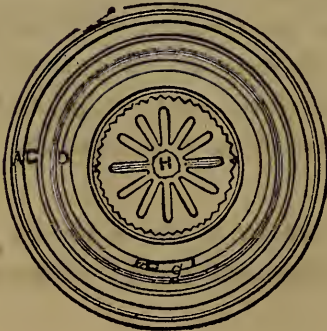


Fig. 5.



UNITED STATES PATENT OFFICE.

DENNIS G. LITTLEFIELD, OF ALBANY, NEW YORK.

Letters Patent No. 39,582, dated August 18, 1863; reissue No. 1,594, dated December 22, 1863; reissue No. 2,881, dated February 25, 1868.

IMPROVEMENT IN BASE-BURNING STOVES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, DENNIS G. LITTLEFIELD, of the city and county of Albany, and State of New York, have invented certain new and useful improvements in a well-known kind of stoves, which I denominate Magazine Coal-Burners; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 represents a vertical section, central from front to back, of a burner comprising my inventions.

Figure 2, a horizontal section, viewed from above, of the lower part of the burner, including the place of combustion, which I denominate the furnace.

Figure 3, a front elevation of the lower section of the burner, including the furnace.

Figure 4, a front elevation of the upper section of the burner.

Figure 5, a perspective view of the lower part of the supplying-reservoir, which I denominate the magazine.

Above the base, A, figs. 1, 3, is a chamber, C C, fig. 1, in which the furnace is suspended. This chamber terminates above in the projecting rim *c*. It is provided with doors, *e e*, fig. 3, in which are draught-registers, *j j*, fig. 3, and through which may be introduced an ash-pan. The furnace D, fig. 1, is of cast iron, in the form of the lower part, inverted, of a church-bell, that is to say, flaring outward until it forms a contact around its whole periphery, with the wall of the chamber C C, fig. 1, its upper edge resting on and supported by a ledge, *d*, projecting inward from the casting, *b b*, fig. 1, or its ledge, *e*.

The furnace has for its bottom my well-known mill-grate, H, fig. 1, described in my Letters Patent, bearing date December 9, 1862, and reissued May 14, 1867, or any other suitable fire-grate. There are one or more apertures through the flaring part of the furnace, which are ordinarily closed by the valve *g*, fig. 2, but which, by opening the valve by any suitable means, may, at pleasure, be made to open a communication between the chamber C C, surrounding the furnace, and the chamber G G immediately above it, and represented in fig. 1. These two contiguous chambers, it will be observed, without this valvular opening, would be completely isolated from each other, but the communication thus opened between them may be made subservient to two valuable purposes. The chamber G G being kept free by its connection with the exit-flue and chimney, the dust evolved in agitating the fire-grate, the valve being open, will naturally pass upward into this chamber, instead of coming out of the open doors of the stove into the room as it would otherwise do. This valvular opening may also be used for the further purpose of checking combustion, instead of resorting, for that purpose, to the expedient of closing the draught-registers *j j*, already described, whereby the atmosphere of the room would become less pure and agreeable. On opening the valve, the air entering through the open registers becomes partially diverted from its upward passage through the grate and burning fuel, while, at the same time, the air thus diverted will, by partially filling the chamber G G, diminish its power to draw air through the fire-grate.

The part of the burner comprising the base, A, the chamber C C, and the furnace D, with their subordinate parts, and connected permanently together in the ordinary manner, may be called its lower section, as shown in figs. 2 and 3. The lower part of the external case above this section, consists of a set of cast-iron plates, I I I, fig. 4, permanently connected, and presenting the form represented in figs. 1 and 4. It has, at its base, a rim, *i*, which fits the rim, *c*, of the lower section of the burner, and at the top it terminates in another rim, *k*. In the plates I I I, fig. 4, are illuminating-spaces, which may be filled with mica.

The magazine should be so constructed, and, in relation to the furnace, so adjusted, as to render it in the highest degree conducive to the efficiency of the furnace, and at the same time, as far as possible, to insure its own durability. The following description will show the construction by means of which I aim to accomplish these desirable ends.

Within the lower section of the external case, and concentric with it, is suspended the lower section of the magazine, the upper end of which is connected by suitable supports or fastenings, with the case or its rim *k*, so as to leave a space between it and the case, for the purpose of connecting the lower and upper parts of the chamber *G G*, as shown in fig. 1, and extends downward in the chamber *G G*, such suitable distance as may be required, in the form of a truncated cone inverted. Near the lower end of the segment *K*, it is abruptly contracted, and the part thus contracted enters the upper end of the segment *L*, as shown in figs. 1 and 5, and covering the upper periphery of the lining of soap-stone or fire-brick, serves to protect it from abrasion by the descending coal. The segment *L* is suspended from the segment *K* by eyes *o o* and stirrups or hasps *p p*, or their equivalents, as shown in fig. 1. The segment *L* is also abruptly contracted, inside, so as to form a shoulder or ledge, *n*, for the purpose of supporting the lining *m m m*, fig. 1, having a corresponding shoulder. This device for keeping the lining in place, not only serves that purpose, but is indispensable also to the preservation of the lower segment of this section of the magazine from destruction, because the expansion of the iron by heat being greater than that of the lining, the lining would otherwise descend by its own gravity, and besides being thus moved from its proper position, would cause the iron to crack in cooling. The downward contraction of this section of the magazine serves the important purpose of preventing the too rapid descent of the coal, and thus of preventing it from becoming too compact, and from pressing too heavily at the place of most active combustion. The freedom from undue compression thus secured, renders the process of combustion more complete and increases the heat evolved.

To complete the structure of the upper section of the burner,

the magazine is extended upward by the superaddition of the upper section, N, consisting either of cast or sheet iron, and terminating at the plate *u*, fig. 1. Its form, it will be seen, is that of a truncated cone. The outer case is extended upward by the superaddition of the segment M to the segment L, fig. 1, with which it is connected at the rim *k*. It is made of cast or sheet iron, and, reaching to the top of the burner, it receives the top-plate, S, having the usual cover, *t*, for an aperture, through which the burner is supplied with coal.

The plate *u* separates the chamber G from the flue Q above, and when the aperture *v* therein, for the admission of coal to the magazine, is closed, it covers the magazine. The slide or valve *y*, for closing the opening *v*, and the passage *w*, for the escape of the products of combustion, the concentric or double flue Q, and the separate chamber P, communicating directly with the exit-flue *r*, are of the same construction and arrangement, and operate in the same manner as the correspondent parts described in Letters Patent granted to me, bearing date December 6, 1862, and more exactly in the reissue of the same, granted May 14, 1867, and, therefore, need no further description here.

The extensions M of the exterior case, and N of the magazine, secured to the lower segments of the same parts, together with the top covers, and the parts under them, and above the plate *u*, constitute the entire upper segment of the upper section of the burner, as represented in fig. 1. The two sections of the burner (figs. 3, 4) are connected by placing the upper upon the lower section, and uniting their rims, *c* and *i*, by short screw-bolts *x x*, fig. 1. This completes the burner for use. To get at the interior parts of it, for the purpose of removal or repair, or to prepare the larger burners for transportation, it is only necessary to unscrew the bolts *x x*.

Those skilled in the art will, I trust, readily perceive the proper modes of carrying my invention into practice, and I will now proceed to describe the operation of the burner as thus constructed.

Preparatory to kindling the fire in the furnace, the sliding cover *y*, fig. 1, is drawn forward. Fire being then applied to

the kindlings, they may be permitted to burn in this manner until the smoke has passed off. The coal is then to be put into the magazine, and the sliding cover *y* pushed back, so as to close the top of the magazine. If the fire is required only for a temporary purpose, the supply of coal may be graduated according to the exigencies of the case, but, if it is intended to continue the fire indefinitely, without interruption, the magazine may be filled with coal. If the supply of coal be small, the whole becomes ignited, and will, unless checked, burn rapidly from all its surfaces, as in a common stove; but, if the magazine is filled with coal, the result is somewhat different. In that case, although the coal becomes ignited up to the end of the magazine, yet the combustion proceeds slowly in the upper part of the furnace, except in that part of the coal at the periphery below and outside of the magazine.

The gases and other products of imperfect combustion which accumulate in the magazine, pass therefrom into the space between the furnace and the lower end of the magazine, and aid in maintaining a vivid combustion at that point, which being made near to and aided by the heated draught through the furnace, assists in the combustion of the coal upon the fire-grate. The gases having been thus utilized and spent, pass up the chamber *G G*, and through the aperture *w* to the flue *Q*, and thence to the exit-pipes.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The devices described, by means of which the magazine, and each of the several sections of which it is composed, are held in their proper positions, while, at the same time, the several parts are so adjusted as readily to admit of being separated and reunited at pleasure.

2. The corresponding notches or shoulders in the iron cylinder and the lining, as described, by means of which the lining is held in its place, notwithstanding the greater expansion of the cylinder by heat, and without danger therefrom.

3. The magazine, constructed as described, in combination with the furnace separated from it, and suspended within a chamber isolated from the chamber surrounding the magazine.

4. The combination of a magazine contracting in diameter from the middle or other line downward to its lower end, with a furnace, suspended within a chamber isolated from the chamber surrounding the magazine.

5. The devices described, by means of which I am able to construct what I denominate the upper and lower sections of the burner, each complete in itself separately, and so to adjust them as to admit of their being conveniently separated and reunited without injury to either.

6. I claim the intercommunication, to be opened and closed at pleasure, between the chamber of a magazine coal-burner, which surrounds the furnace, and that which surrounds the magazine.

DENNIS G. LITTLEFIELD.

Witnesses

HENRY C. LITTLEFIELD,
THEO. F. MINER.

Fig. 1.

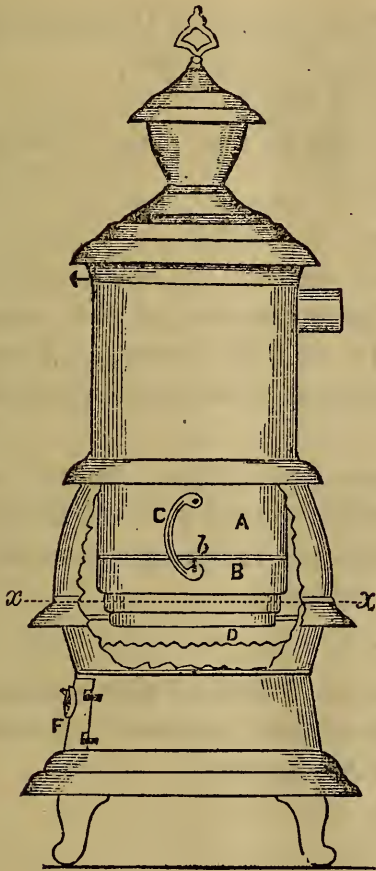


Fig. 2.

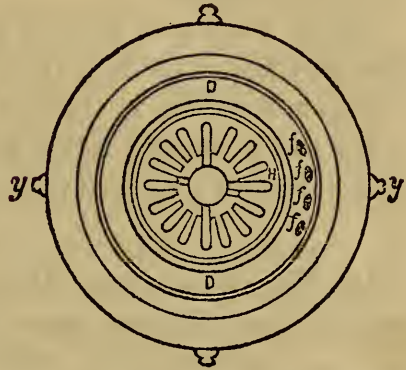
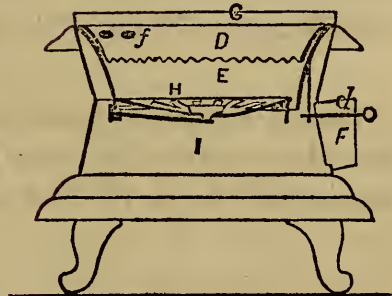


Fig. 3.



To improve the construction of 1863, I devised certain improvements which were patented on the 17th of April, 1866. The following description of the drawings, and the claims will show the nature of those improvements:

Fig. 1 is a side elevation of a cylinder stove, with a portion of the outer casing broken away in order to show more clearly my improvements.

Fig. 2, a top plan view of the lower portion of the stove, all that part above the x, x (Fig 1) being removed, and,

Fig. 3, a section in the line y, y, of Fig. 2.

My improvements relate particularly to that class of stoves which contain a reserve fuel magazine.

CLAIMS.

1st. The employment of the curved hook (C) when used in combination with the upper and lower sections of the magazine, or self-supplying cylinder (A and B) constructed and arranged in the manner and for the purposes substantially as herein described and set forth.

2d. The employment of the annular agitator, damper, or valve (D) constructed, arranged and combined with the fire-pot or fire chamber (F), in the manner and for the purposes substantially as herein described and set forth.

To still further improve these stoves, I devised the construction known as the MORNING GLORY of 1866, and received *letters patent* therefor on the 21st day of April, 1868.

No. 77,056.

THE UNITED STATES OF AMERICA.

TO ALL TO WHOM THESE LETTERS PATENT SHALL COME :

WHEREAS, DENNIS G. LITTLEFIELD, of Albany, New York, has alleged that he has invented a new and useful Improvement in Base Burning Stoves, and has made oath that he is a citizen of the United States, that he verily believes he is the original and first inventor or discoverer of the said improvement, and that the same hath not to his knowledge and belief been previously known or used ; has paid into the treasury of the United States the sum of thirty-five dollars, and presented a petition to the Commissioner of Patents praying that a patent may be issued therefor.

These are therefore to grant to the said DENNIS G. LITTLEFIELD, his executors, administrators, or assigns, for the term of seventeen years from the twenty-first day of April, one thousand eight hundred and sixty-eight, the full and exclusive right and liberty of making, using and vending to others to be used the said improvement, a description whereof is given in the annexed schedule, and made a part of these presents.

In testimony whereof, I have caused these Letters to be made Patent and the seal of the Patent Office to be hereunto affixed. Given under my hand at the city of Washington, this twenty-first day of April, in the year of our [L. s.] Lord one thousand eight hundred and sixty-eight, and of the independence of the United States of America the ninety-second.

W. T. OTTO, *Acting Secretary of the Interior.*

A. M. STONE, *Acting Commissioner of Patents.*

Countersigned and sealed with }
the seal of the Patent Office. }

Fig. 1.

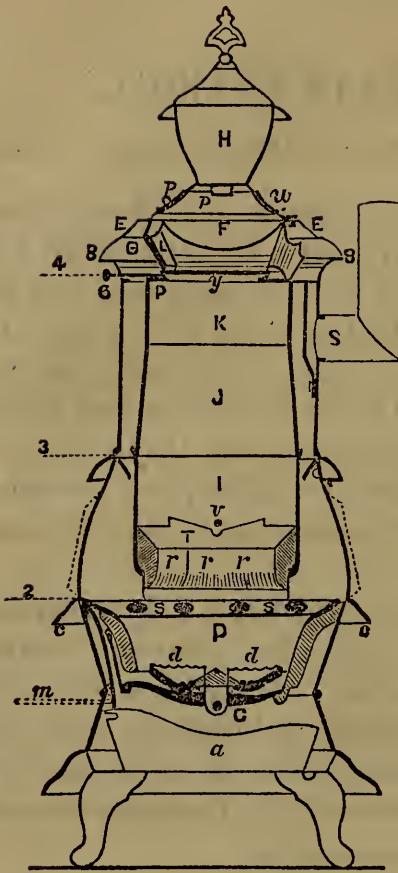


Fig. 3.



Fig. 4.

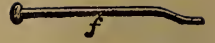


Fig. 5.



Fig. 6.



Fig. 7.



Fig. 2.

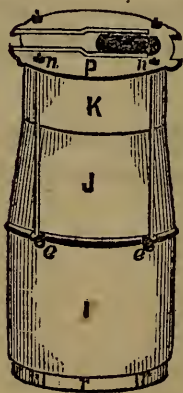


Fig. 8.



Fig. 9.



UNITED STATES PATENT OFFICE.

DENNIS G. LITTLEFIELD, OF ALBANY, NEW YORK.

Letters Patent No. 77,056, dated April 21, 1868.

IMPROVEMENT IN COAL-STOVES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, DENNIS G. LITTLEFIELD, of the city of Albany, and State of New York, have invented certain new and useful improvements in a well-known kind of stoves, which I denominate Magazine Coal Burners; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a central vertical section of the stove from front to back.

Figure 2 is a perspective view of the magazine having its cover removed.

Figure 3, the magazine-cover.

Figure 4, the magazine-cover handle.

Figure 5, the hopper.

Figure 6, the flue-plate, which, when in place, forms the inner side of the downward passage to the smoke-pipe.

Figure 7, the top cover, with a sliding valve and urn-basin.

Figure 8, a transverse view of a segment of the agitator, dust-register, and "mill-grate."

Figure 9, a segment of the ring of spurs projecting inward from the exterior case, and deflected downward, for the purpose of steadying the magazine and keeping it in its central position.

The inventions wherein I now desire to secure an exclusive property are the last of the series of inventions by which I have at length brought the magazine coal-burner to the perfection exhibited in what I denominate the "Morning Glory of '66," as I now construct it. These new inventions work no change, either of structure or form in the exterior radiating-case, as it presents itself longitudinally to the eye of the observer, except by the adaptation of a sliding valve immediately below the urn-

bowl at the top of the cover, nor do they lead necessarily to any change of those interior parts of the burner which are contained in its lower region, extending upward to line 2, fig. 1.

The ash-pit, C, and the doors opening into it, through which the ash-pan, *a*, may be introduced and taken out, and also the furnace, D, including my "mill-grate" *d d*, fully described in my patent bearing date December 1862, and reissued May 14, 1867, remain unchanged by my new inventions. The furnace, however, as of late I construct it, contains the annular agitator, *s s*, figs. 1 and 8, described in my patent bearing date April 17, 1866. It consists of a movable cast iron plate, corresponding in form with the abruptly-flaring part of the furnace, on which it lies when at rest, and whereon it may be readily moved horizontally, each way, through a limited space, by means of a lever, *m*, fig. 1, inserted into the lower end of a flat bar, fixed at the upper end to the agitator, and descending into the ash-pit C. The dark oblong spots appearing on fig. 1 represent closed holes through the furnace, and the agitator has corresponding holes. The holes of both in coincidence, and consequently open, are shown in fig. 8.

I give this brief description of it here because I hope it may be useful to avail myself of this opportunity to inform the public, that, in addition to the uses of this valuable appendage, specified in my patent of April 17, 1866, it may also be made auxiliary to my newly-invented valve, at the top of the burner, in checking combustion, when desirable, by the admission into the chambers above of cold air from without, entering through the draught-registers in the doors, and thus avoiding the necessity of closing these registers and rendering the air in the room less pure.

What I deem the most important of my new inventions, herein described, relates to the adjustment of the magazine within the case, and by "magazine" I intend and desire, here, and throughout this specification, to be understood to refer exclusively to a magazine separated from the furnace, completely surrounded by an open space or chamber, and closed at the top, except when opened for the purpose of being replenished with fuel.

In other respects my invention is not limited to any particular form or structure of the magazine. It may be of uniform diameter throughout its whole length, or taper upward or downward; it may be cast whole, or in several parts; and it may be wholly, or only in part, of cast iron.

But the magazine, having nothing below it to rest upon, must be upheld and kept in a central position by other means.

Magazines of this description have accordingly been heretofore supported by fastening them to the sides of the case, a mode of construction shown by experience, and which may be otherwise demonstrated, to be highly objectionable, and accordingly the invention of some sufficient method of supporting them, independently of any lateral connection with the case, became a great desideratum.

Hanging directly over the furnace, and immersed in hot gases generated by combustion below them, they become heated to a very high degree, and this effect is intensified by the accumulation and detention of these gases within the magazine, for want of any opening at the top of it for their escape. Thus unavoidably exposed without and within to the constant action of so high a degree of heat, the magazine will ultimately wear out and require to be replaced. The outer case, it is true, must also be heated to a high degree, because it is only by the radiation of heat from its outer surface that the burner becomes effective. But the hot gases come in contact only with its inner surface, and are counteracted by the comparatively cool atmosphere in contact with its outer surface. This inferior degree of heat is insufficient to destroy it, and freed from all destructive agencies proceeding from other causes, it would endure for a life-time.

But under the old mode of adjustment it nevertheless became gradually weakened, and at length worthless. This want of durability was referable mainly to the lateral mechanical connection of the magazine with the case. Its lower section, from line 2 to line 3, fig. 1, necessarily consists of several plates, and is fastened by bolts to the upper section, extending from line 3 to line 4, which is also necessarily cast in several plates, and whether the burner is to be used for the purpose of warming

the apartment in which it is placed, or to be placed in basements and covered with a bright metallic shell, or surrounded by brick walls, for the purpose of warming rooms above, it is indispensable both to health and comfort that the gases generated by combustion should be prevented from escaping through its numerous joints.

This is effected by the interposition of an adhesive and indestructible cement. It will be seen at once, therefore, how important it is, that, when the case is once set up, its joints should remain undisturbed, and how difficult, not to say impossible, it is, when separated, to restore them perfectly, or to restore the structure to its original stability.

But when the magazine is connected with the case in the manner I have described, no effective access can be attained for the purpose of repair, nor can the magazine be taken out for this purpose without separating the joints of the case. This, as will be best understood by those best "skilled in the art," was a "grievous fault."

But the destruction of the case was accelerated by another cause, also resulting from the common mode of construction. Iron expands by heat, and its expansion is in proportion to the degree of heat to which it is subjected. But, as already stated, the magazine, placed in close proximity to the furnace, and directly over it, must unavoidably become heated to a much higher degree than the case, and must consequently undergo a much greater degree of expansion. The expansion of iron by heat, like its contraction by frost, is one of those operations of the laws of nature which admits of no restraint. When its effect would otherwise be injurious, the only alternative, therefore, is to neutralize it by evasion.

There is no difficulty in making the joints of the case airtight by cement, but while it was laterally connected with the magazine, and was thus subjected, by transmission, to the irresistible action of its greater expansion, the joints were inevitably made to yield, and, before long, to permit the escape of gas. But by superseding the necessity of ever disturbing the joints of the case for the purpose of repairing or replacing the magazine, and by relieving the case from the expansive

force of the magazine, my invention effectually avoids both of these causes of instability.

I detach the magazine altogether from the sides of the case, and suspend it by means of the strong cast iron plate forming its top, P, fig. 1, and shown also in fig. 2, which is firmly upheld by a narrow ledge projecting inward from the case, on which it rests, and when the aperture through this plate (see fig. 2) for the admission of coal to the magazine is closed by the cover *y*, figs. 1 and 3, it completes the floor of the chamber, G G. It is fastened to the magazine by means of four rods (two of which are shown in fig. 2), which pass upwards from brackets, *e e*, through the plate, and are held by nuts *n n*, fig. 2. For the purpose of guarding more effectually against any vibration of the magazine, I surround it with a ring of spurs, *o o o*, fig. 9, projecting from and cast with the case at or near line 3, fig. 9, curved downward and extending very nearly to the magazine.

The magazine, thus severed from all lateral connection with the case, it will be seen, may, at pleasure, be conveniently lifted out for repair or replacement, by simply unscrewing the main cover, held to its place only by the bolts, 8 8, fig. 1, and removing it, together with the parts immediately under it, represented by figs. 3, 4, 5 and 6. These parts, it will be noticed, are loose pieces, unconnected except by relative position with each other or with the parts on which they rest. They can therefore be readily removed when the main cover is off. But it is necessary that when the burner is in use they should be firmly held in their respective proper positions. To this end they are so adjusted to each other, as shown in the drawings, that, if the hopper be securely fixed in its place, the other parts will also be kept in theirs.

Availing myself of this arrangement, I accomplish the end in view by so adapting the upper edges of the sides of the hopper, in point of form and height, to the main cover, E E, fig. 1, when in place, that, on being bolted down, it confines the hopper, and indirectly, also, as already shown, the other parts, immovably in their places.

By the arrangement I have described, it is obvious that the exterior shell becomes in itself an independent, stable, and

enduring structure, unaffected by the expansion or the removal of the magazine, and the necessity of separate fastenings for the several parts occupying the chamber G G, fig. 1, is superseded.

In applying these inventions I have been led also to modify the magazine. As I now construct it, its forms and structure are shown in fig. 2. It consists of three segments, I, J and K, and the lining of fire-brick or soap-stone, *r r r*, supported by reciprocating shoulders, as described in my patent of August 18, 1863. The segments I and J are of cast iron, the segment K of wrought iron, which I prefer to cast iron, because it affords an easy and convenient means of altering the length, and consequently the capacity of the magazine, by lengthening or shortening this part of it. The three segments are bolted together, as shown in fig. 2, and are thus united in one firm structure, and the "stirrups," described in my patent of August 18, 1863, are dispensed with. The device described in that patent for protecting the lining from abrasion, being inapplicable to the magazine as above described, I have invented another means, which also serves the additional purpose of holding the lining more firmly in place in shipping and transporting the burner.

It consists of an annular casting, T, fig. 1, which I call the "brick-ring." In form it resembles an ordinary tin pan without its bottom. Its smaller diameter is a little less than the inner diameter of the lining at the top, and when in its place its lower edge is consequently a little lower than the inner periphery of the lining. Its upper diameter corresponds with the inner diameter of the magazine where it lies, and its upper edge being curved downward at two opposite points, so as to allow it to pass down over small knobs, *v*, fig. 1, cast for the purpose, on the inner opposite sides of the magazine, it may, by a brisk rotary movement, be made to wedge firmly between the lower sides of the knobs and the upper part of the lining, and thus to hold the lining in its place, while by lapping down over its upper periphery, it protects it from injury by collision with the coal.

It often becomes necessary, when the draught of the chimney is strong, to check a too vehement combustion. This may be most effectually done by closing the draught-register in the doors of the ash-pit. But it is desirable, when on other accounts unobjectionable, to keep them open for the purpose of insuring an agreeable and healthful atmosphere in the room, and I have to this end adapted a sliding valve or regulator in the upper cover, *w*, fig. 1, of the burner, shown at *P*, fig. 7, and consisting of a series of oblong holes around the cover, between its periphery and the urn-bowl, to be opened and closed at pleasure, by a movable plate, having corresponding apertures, and nicely fitted to the cover. By the admission of air through this valve into the small chamber *G G*, fig. 1, through which the upward current from below finds its way to the smoke pipe, *S*, fig. 1, the upward current will be considerably impeded by partial obstruction, and also by being cooled, and the combustion in the furnace will be sensibly checked.

If the handle *f*, fig. 4, by means of which the cover *y*, figs. 1 and 3, is opened and closed, and which must unavoidably pass through the outer case, be fixed immovably to the cover, it is manifest that the cover cannot be removed from the chamber in which it operates, and consequently the magazine could not be taken out without breaking the handle. To remedy this inconvenience I have invented a handle represented by fig. 4, and an aperture in and through the cover *y*, by means of which the handle, kept in its position by its passage through the case, cannot possibly be detached from the cover by use, but may, nevertheless, without difficulty, be separated by raising the cover from its bed, preparatory to lifting the magazine out of the case.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. The complete separation of the covered magazine from the sides of the surrounding case, and the devices described whereby it is suspended and securely held in its proper position for use, while it may at pleasure be taken out of the case and again restored to its place, without injury or disturbance to the case.

2. The adjustment, in the manner described, of the handle of the cover of the magazine.

3. The reciprocal adaptation of the magazine-cover, the flue-plate, and the hopper to each other, and of the hopper to the cover of the burner, in the manner and for the purposes specified.

DENNIS G. LITTLEFIELD.

Witnesses :

HENRY C. LITTLEFIELD,

A. BARTON HOUGH.

Besides the inventions secured by these patents, is the new construction for an illuminating case, upon which I have made claims for two distinct inventions. These, together with those secured by the foregoing patents, comprise twenty-five distinct inventions, twenty of which, viz.: The 1st, 2d, 5th, 6th, 7th, 8th, 9th, 10th, 11th and 12th, claim of the patent of 1862; the 2d, 4th, 5th and 6th, claim of the patent of 1863; the 2d claim of the patent of 1866; the three claims of the patent of 1868, together with those relating to the new case, are embodied in

THE MORNING GLORY OF 1868.

The present stove is not susceptible of having further invention bestowed upon it, and I am of the opinion that it will not require further improvements, mechanically. All improvements that have been made upon the stove of 1866, can be applied to that stove; and should it be deemed advisable to make further mechanical changes, they will be so made that the improved parts can be applied to the present stove, as changed from that of 1866.

ALBANY, August 1, 1868.

ECONOMY.

THOSE persons that have read of the MORNING GLORY from year to year since it was introduced, in 1861, must have observed that this word has seldom been used. This omission has occurred for two reasons: First, my observation had taught me that when it had been desirable to *sell* a stove, whether it was or was not an economical one, this word, prior to the date of my inventions, had been extravagantly used, so much so, that in my view, the public would be justified in looking upon my inventions with suspicion should I adopt the common method, and claim for them great economy in fuel. And, second, I omitted to make a more extravagant use of this word, for the reason, that, in my view, it would be out of place with all sensible people, they knowing the purpose of my inventions, would also know that should I succeed in making the BASE BURNING STOVE a useful machine, that economy would follow as a necessary sequence. But, notwithstanding I have neglected to *write* upon this subject, I have conversed on the subject thousands of times, when called upon to explain my views. It has been my custom for the past ten years, when asked how much coal it would require to warm a certain size room, or to run a certain size stove, to ask the customer: First, what kind of a stove he had been using, and receiving his reply, would then ask if he had been able to warm the room with such stove, when, if he replied in the affirmative, without caring to know the quantity of coal he had burned, I have uniformly guaranteed a saving of one-third over the former stove. I have given such a guaranty hundreds of times, and never, in a single instance, failed to give the customer the satisfaction guaranteed. But when the party informed me that he had been unable to warm the room, and desired a different stove to enable him to do so, I have admitted my inability to answer the question, and stated that I could only guarantee a *warm* room; freely admitting that

time alone could inform him whether or not he would burn more coal than with the former stove. I have known instances where a No. 11 stove (the present No. 23) has warmed a moderate size room during the entire winter with less than one ton of coal; and I have known instances where the same stove has burned from four to five tons, owing to its being a very cold room where it was used.

THE LITTLEFIELD STOVE MANUFACTURING COMPANY will authorize their customers to treat the matter in selling the MORNING GLORY STOVES in just this way, viz.: For all persons that have been able to warm their apartments with any stove, whether it was a common stove, or one of the so-called BASE BURNERS, or even if it was a stove said to be *just like* the MORNING GLORY, or an "*improvement* upon the MORNING GLORY," where the customer has used such a stove and succeeded in warming his apartment, and knows how much coal he has burned, a MORNING GLORY of 1868 may be put up in its place, with a guaranty of equal heat, with an economy of at least one-third.

In many instances more than this can safely be guaranteed; of this, however, the dealer in the MORNING GLORY STOVES must be the judge, and govern himself accordingly.

D. G. LITTLEFIELD, General Sup't of the
LITTLEFIELD STOVE MANUFACTURING Co.,
Albany, N. Y.





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